

Pseudoslits Spectrometer

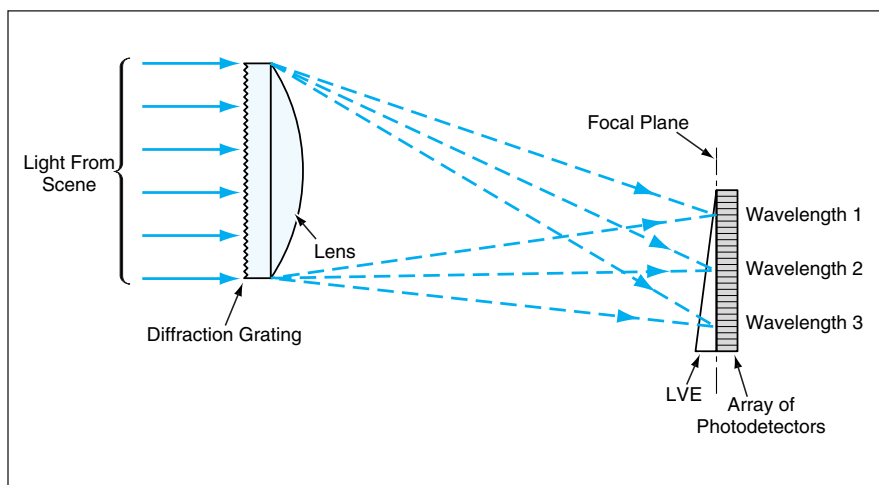
Functioning similarly to a slit spectrometer, this instrument would be optomechanically simpler.

Goddard Space Flight Center, Greenbelt, Maryland

The pseudoslits spectrometer is a conceptual optoelectronic instrument that would offer some of the advantages, without the disadvantages, of prior linear-variable etalon (LVE) spectrometers and prior slit spectrometers. The pseudoslits spectrometer is so named because it would not include a slit, but the combined effects of its optical components would include a spatial filtering effect approximately equivalent to that of a slit.

Like a prior LVE spectrometer, the pseudoslits spectrometer would include an LVE (essentially, a wedgelike narrow-band-pass filter, the pass wavelength of which varies linearly with position in one dimension) in a focal plane covering an imaging planar array of photodetectors. However, the pseudoslits spectrometer would be more efficient because unlike a prior LVE spectrometer, the pseudoslits spectrometer would not have to be scanned across an entire field of view to obtain the spectrum of an object of interest that may occupy only a small portion of the field of view. Like a prior slit spectrometer, the pseudoslits spectrometer could acquire the entire spectrum of such a small object without need for scanning. However, the pseudoslits spectrometer would be optically and mechanically simpler: it would have fewer components and, hence, would pose less of a problem of alignment of components and would be less vulnerable to misalignment.

The pseudoslits spectrometer would include an input optical component



The LVE would be matched, spatially and spectrally, to the focal-plane spectral dispersion pattern of the diffraction grating.

that would both spectrally disperse the light from the scene under observation and focus the light onto the array of photodetectors. The input optical element could be, for example, concave diffraction grating, a combination of a lens and a prism, or, as shown in the figure, a combination of a lens and a diffraction grating. The LVE would be custom fabricated so that, at the focal plane, its spatial variation of pass wavelength would match the spectral dispersion pattern created by the grating. As a result of this match, the LVE would select the spectrum of only one slitlike strip in the field of view.

Hence, position along one axis of the array (in the case of the figure, the axis perpendicular to the page) would corre-

spond to position along the strip in the scene, whereas position along the other axis (the vertical axis in the figure) would correspond to the wavelength of light. In other words, the pseudoslits spectrometer would measure the spectrum of a narrow strip in the scene. To acquire data to construct a spectral image of the entire scene, one would have to scan the pseudoslits spectrometer to scan the strip across the scene.

This work was done by Dennis C. Reuter and George H. McCabe of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-13806

Waste-Heat-Driven Cooling Using Complex Compound Sorbents

Development of improved sorbents revives a long-neglected heat-pump concept.

Lyndon B. Johnson Space Center, Houston, Texas

Improved complex-compound sorption pumps are undergoing development for use as prime movers in heat-pump systems for cooling and dehumidification of habitats for humans on the Moon and for residential and commercial cooling on Earth. Among the advantages of sorption

heat-pump systems are that they contain no moving parts except for check valves and they can be driven by heat from diverse sources: examples include waste heat from generation of electric power, solar heat, or heat from combustion of natural gas.

The use of complex compound sorbents in cooling cycles is not new in itself: Marketing of residential refrigerators using SrCl_2 was attempted in the 1920s and '30s and was abandoned because heat- and mass-transfer rates of the sorbents were too low. Addressing